



Phytoplankton Field Sampling

Note: these protocols are also available visually at seator.org/training under “Training Videos.”

Materials

- 20 micron mesh phytoplankton net with 3-5 meters of string attached
- Sample bottle and cap
- Thermometer (Celsius) with at least 1 meter of string attached
- Refractometer kit (with disposable pipette)
- Notebook or printed datasheet
- Pencil
- Squirt bottle
- Tide chart
- Timer
- Labeling tape
- Permanent marker
- Field Kit Case

Phytoplankton Collection Steps

1. Data recording
 - a. Start a new datasheet. Record the site location, sample date, time, tide level, current cloud cover/weather, wind intensity, and sampler name.
 - b. Include any unusual or notable observations from sample day or the days leading up to sampling; for example, “previous three days were sunny,” or “boat activity at sampling dock, churned seawater.”
 - c. Hold the thermometer by the attached string for one to five minutes, until the temperature has stabilized and stops moving. Record the air temperature in degrees Celsius.
 - d. Drop the thermometer into the water and tie it off. After five minutes retrieve the thermometer and immediately record the Celsius temperature.
 - e. The salinity will be measured from the sample later, using the refractometer and pipette.
2. Rinsing bottles
 - a. Take the sample bottle and cap out of the field kit. Rinse the sample bottle and cap with site seawater three times. Start by unscrewing the cap; keep it handy

because it will be used soon. Fill the bottle at least one-third of the way full, then shake and invert the bottle. Hold the cap in your free hand and pour the seawater out of the bottle, over the cap. Repeat the rinsing process two more times. Gather rinse water slightly upstream from where you poured out the wastewater.

- b. The squirt bottle also needs to be rinsed three times. Make sure to squirt water out of the spout during each rinse cycle. After the squirt bottle has been rinsed, fill it to the maximum fill line marked on the bottle. Recap the bottle and test out the squirt water pressure. You may need to pour a little water out to improve the pressure.
3. Plankton tow
 - a. Screw the sample bottle onto the plastic cod-end of the net. Make sure it is on straight and securely. Keep the cap somewhere nearby and safe from blowing away.
 - b. Drop the plankton net with attached bottle into the ocean and quickly scoop up a netful of water. Completely lift the net and bottle out of the water. The sample bottle should fill with water. Repeat this step as necessary until the sample bottle is full and without air bubbles.
 - c. This time slowly sink the net and bottle straight down into the water. The net and bottle should be completely submerged and without air bubbles. An air bubble in the net or bottle will cause them to float towards the surface.
 - d. Next, let the bottle and net sink as far down as the string will allow: all the way to the end of the string or until the bottom of the bottle hits the seafloor. If you reach the seafloor there is no need to let out more string.
 - e. Let the net hang in the water while you get your timer ready for three minutes.
 - f. Start the three-minute time and immediately pull the net almost to the surface, but without breaching the surface. Simultaneously begin walking.
 - g. For three minutes, walk at a casual, steady pace with the net horizontally trailing through the water behind you. The net should follow closely behind you, much like walking a dog. Pull and release tension on the string so that the net creates an up and down, wave-like pattern through the water. The net should “swim” through the top meter of water, but all parts should remain beneath the surface. If the sample site has a significant freshwater lens, try to stay underneath that top layer of freshwater. Keep an eye on your net as you walk as it can easily snag on objects or become tangled. If you need to turn around, watch the net to make sure it does not breach the surface.
 - h. When the three minutes have passed, immediately stop towing and pull the entire net with the bottle straight out of the water. You do not need to make it back to your starting place; just pull the bottle out wherever you are when the three minutes are over.
 4. Concentrating

- a. Hold the plankton net up vertically and use the squeeze bottle to rinse the outside, inside, and the string, directing the water and any matter down towards the sample bottle.
 - b. After spraying down the bottle, hold the net at about a hands-length distance from the bottle, or at the lower one-third of the net. Grasp the net firmly enough that water and debris will not flow past your fist. With your other hand, gently but quickly tip the bottle, allowing water to pour back and forth between your enclosed fist and the bottle. You will pour out some water, filtered through the mesh net, with each bottle tilt. Continue this quick bottle tipping motion until about one-third of the bottle has been poured out. Do not pour out more than 40% of your sample.
 - c. Briefly rinse the bottom third of your net, the portion between your fist and the bottle with the squirt bottle. You are doing this final rinse to direct any algal matter that escaped onto the net back into the sample. You want to make sure you do not add too much water back into the now concentrated sample.
 - d. Unscrew the bottle from the net cod-end and cap.
5. Salinity
- a. Open the refractometer kit and retrieve the disposable pipette.
 - b. While squeezing the top of the pipette, put the other end into the seawater sample. Release the top so the pipette fills with seawater. Gently shake the pipette and squirt the water out, but not back into the bottle. Repeat this rinsing action three times.
 - c. Flip the plastic, hinged cover off of the blue prism area. Take a pipette full of the seawater sample and completely cover the prism area. Carefully flip the plastic cover back over the blue prism area and seawater sample.
 - d. Point the refractometer towards a light source, such as the sun, and use one eye to look through the eyepiece. When you look inside the refractometer, the lower portion should be blue and the upper portion should be white. You will also see two sets of numbers. The numbers on the right are the salinity measurements. Salinity is measured in parts per thousand (ppt).
 - e. Record the number where the blue area and white area meet-- that is the salinity level.
 - f. Leave the used pipette out of the refractometer kit case, to be disposed of by staff.
6. Clean up
- a. All equipment will be rinsed with warm, soap-free water back at the lab. It is important to rinse and dry field equipment after every use to avoid corrosion, salt buildup, rust, mildew, sample contamination, and other issues.